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**(54) TIP PIECE OF LASER SYSTEM FOR TREATING BIOLOGICAL TISSUE**

(57) Abstract:

FIELD: surgery; orthopedics; stomatology. SUBSTANCE: invention offers advantages due to fact that interior of tip piece of laser system for treating biological tissue contains acoustic detector which receives information of state of biological tissue to be treated. Information thus-received serves to optimize tissue treatment process conditions. EFFECT: minimum invasive action. 2 ci, 2 dwga

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(56) References cited:

1. *ЗасИБКа Ннонма №1-16168, №1-161 Б 17/36, 1986.* 2. *флент ЕББ № 0073617, №1-161 Б 17/36, 1983.*

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(73) Proprietor: АнвТНлннеп I'pxrOpnfl БОрхсоБМЛ

(54) HAKOHE<sup>L</sup>THLIK JIA3EPHOYI CLICTEMb1 jji151 OBPABOTKI4  
BKOJIO'I'LI<sup>9</sup>IECKO1 TKAHI4

(57) Abstract:

llpeRnaraeTcsl yCTpofCTBO, KOTOpOe MO?KeT 6bITb MCHOHb3OBAHO B xapypl'MH, opTo110AH11 M cTOMaTONorMM. YCTpofCTBO o6ecnetmBaeT MHBMManbHyIO BHBA3I BHOCTh M y JiO6CTBO nny npooejleHMM na3epbtx onepaum . 3Tx npeaMymecTba RocTUrало'c5I 6narorapsi 3aipeInIeH1410 BHyTpb HaKOHe<sup>L</sup>muKa 11a3epHo2 CMCTeMbI o6pa6oTKN 6MOTKaBM aKyCCIMeCKOpo npBeMnMKa, KOTOpblfl SIBnHeTc5I npMeMHMKOM MHdJopMaljHM o COCTORHMM 6MOnOpK<sup>9</sup>eCKOii TKAHM, Heo6xoJ;HMoi4 An,J;OCTM?KeHMR OITMManbHOI'O peJKMMa o6pa6oTKM. 1 3.11. 4)-nbI, 2 Mn.

Description [Onrcarn a H3o6peTea<sup>5a</sup>]:

M306peTeHHe OTHOCHTCH K McJjH1HCKOI TeXHr'Ke H MOxte'r 6EITb HCIIOnb3OBaHO B xapyprzi. opTone;/HH H CTOMaTonopHH grin o6pa6crrxm MSIrKrIX H TBep.Jjbnc TKaneii.

I43BeeTeH HaKOHe<sup>4</sup>fiHK na3epHoro exanbneng, cojjeprcaulzii CpeJCTBO JjocTaBxu na3epHoro H3nytleHHB go HOBepxHocTH o6pa6ammaeMoli 6HOTKarn [1] OCHOBNbIM He.r OCTaTKOM JjaHHOro yCTpOICTBa \$IBn5leTC\$1 OTCTbCTBHe B HCM HppHPaU,HOHHOro KaHana, a TaK}Ke epege 'rBa, no3BonBionLero OnnegeHTb BHJj o6pa6aTbIBaeMoi TKaHH.

†13BCCTeH Taxxe na3epHb11? HaKOHe<sup>4</sup>HHK jjnB 6opManumm, KOTOpbIrl 5IBnHeTC51 HaH6onee 61113KHM 110 TCXHHUCCKO2 CyIIHOCTH H npHHCIT 3a npOTOTH [2] OTOT HaKOHe<sup>4</sup>HIK cor epHcHT, 'Tome epeJjcTba JjocTaBKH na3epHoro H3nyueHHB, Cpege''Bo JjocTaBKH go nosepxnocTH o6pa6aTbIsaeMoil 6HOTKaHH opoiaiouLeii xHgKoCTH.

OCHOBNbIM HegOCTaTKOM npOTOTHna 5IBnHCTC51 OTCTbCTBHe B HeM npaeMHHKa HH(4OpMaLHH 0.cOCTOCHHHH o6pa6aTbIBaeMOLI TKaHH, HO3BOJIBIOHLeO onnejeHTb ee BHJj.

3aJjaua, Ha peineHHe KOTOpOii Hanpaseno H3o6peTeHHe, 3axnio 'laeTeH B cO3JLaHHH yCTpoiCTBa, o6ecne<sup>5a</sup> aBailoLero yJjocTB0 npoBe)LeHH\$e na3epno\$ o6pa6oTKH 6HOTKann npa ojjHOBpeMCHHOM onnegeHHH BHJja m COCTOBHHH o6pa6aTbIBaeMo% 6HOTKaHH, tiro, B cBOIO Ouepejib, o6ecne<sup>5a</sup> H4BaT MHHHManbHio HHBa3HBHOCTb.

3agaua peHiaeTen npH ocylgeCTBneHHH H3o6peTeHHB 3a cuer'rexHHUecxopo pe3ynbTaTa, 3axnio 'taloineoeB B OHTHMH3aLHH ycO6H2 npHeMa HH4opMaLHH o COCTOBHHH o6pa6aMIBaeMo2 TxaHH.

TexHHUecxafl pe3ynbTaT JjocTHraeTCB 'rem, yTO BByTpH HaxonegHHKa na3epaoai CHCTCMbi p. n o6pa6oTKH 6Honoralecxog TxaHH, COJjepr}KauLeM CpeJCTBO JjocTaBKH na3epHOro H311yueHHB H O HOBepXHOCTH 6HOTKaHH, 3aKpenneH aKyCTH 'leCKHIp HpHeMHHK, BXOJJ KOTOpO COHpb}KCH c MeCTOM B03Jje\$CTBHB Ha 6HOTKaHb, TaKytO COOTHOnellHe pacCTopHHB OT OHTHueCKOii OCH Ha BbIXOJje HaKOHeuHHKa go BXOJLHO% HoBepxhocTH .aKyCTHueCKOro npaeMHHKa H paCCTOHHH151 OT HOBCpXHOCTH HaKOHeTHHKa B MCCTe ero OnTH'leCKOro BbIXOJja Jjo MecTa B03Jjei2CTBHB Ha 6HOTKaHb HaXOJ ITCSI B npegeanax OT 1: 5 po 4:1. 9neKTpa4eCKH2 BbIXOJj aKyCTHueCKOro npzeMHHKa cog :platen c 6HOKOM perHCTpaLHH HOCTpejCTBOM 3KpaHHpOBaHHO'i O Ka6eHb.

B HiaxoHeuHHKe MO}KCT COJjeprHcaTbCB cper c rao JjocTaBKH opoivalou.ei2 x{HJJKOCTH JJO HOBepXHOCTH 6HOTKaHH.

M3BeCTHO, 'TO 944eKTHBHOCTb na3epHOii o6pa6oTKH 6HOnOraLeCKO2 TKaHH c OJJHOBpeMCHHbIM o6ecneueHHeM 11H3KO2 LHBa3HBHOCTH (CTeHeHH HeKpO3a) 3aBHCHT OT JLTHHbI DOHHbI H MOHKOCT'pH H4a3epHOro H3nyueHH51, 3HeprHH H BpeMCHH na3epHOro B03JjeicTBaH H, JJJB HeKOTOpIX BHJjOB TKaHH, BKHJKOCTHOro OpOHLeHHB 30HbI na3epHO o6pa6oTxH (CM. nanpaMep, Proceeding of Laser-Tissue Interaction V 24-27, January 1994, Los Angeles, California, Vol 2134A).

MCCnejjoBauHH, npoBeJjeHHbie aITOpOM, HOKa3aHH, '4To npH 9TOM Heo6xo) HMa ogHOBpeMeHHaB onTHMH3an asi yKa3aHHbIX napameTpoB Jjn, Ka}KJjOro BHJja 6HOTKaHH.

1411bMH CIOBaMH, He06XOJjaMbI: B03MQ)KHOCTb Bb16opa OHTHManbHbIX JjnHH BOnH n3nyuennii na3epoB asia Hx cMeda, perCTpaYas1 Hpoiecca na3epaoii JjeeTpyKILHH, BHJja H CoCT05111151 6HOTKaHH H yHpaBneHHB J(nIIHOii BOnHbI, MOHBHOCTbIO, 3Hepr'He2 H BpeMCHCM na3epHOro B03JjeICTBHB, cacreMa opoineHHB 30HbI na3epHo2 o6pa6oTKH.

OnTHM113aLH51 pe)icHMa o6pa6oTin Bo3MO2KHa npH HanH 'IHH CHCTeMbI 06paTHO2 CB513H, o6ecneunBaloujeit ynpaaneHHe napamepamH na3epHoro H3nyueHHB B 3aBHCHMOCTH OT COCTOBHHH H BHJja o6pa6aTbIBaeMoti TKaHH, T.e. Heo6xo) HM HpaemHHK HHH4opMaLHH o COCTO51HHH2 o6pa6aTbIBaeMo2 TKaHH, BbIXOJj KOTOpO'i O coeJjHHeH c 6HOKOM ynpaBneHHB napameTpaMH na3epHoro H3nyueHHB.

lpneMHHKOM HH4IOpMailHH 0 COCTOSIH HH o6pa6aTbIBaeMoil TKaHH MO)KCT 6bITb aKyCTH<sup>1</sup>leCKH7 npHCMHHK 3ByKOBOYI BOTLHbI, KOTOpa5I o6pa3yeTcI B pe3yhbTaTe na3epHopo pa3pymeHH5I 6HOTKaHH. )Ina pa3TH<sup>1</sup>mbIX TKaHeil aMI TIHTyjja aKyCTMICCKO\$ BOFhbI pa3natma (CM. Renso Salimbeni "Shock wave models keep laser surgeons on target" Opt Laser Europe June. 1994, p.p. 37-39).

IlpH pa3pynlemw 6HOTKa m Mex,ny Ha<sup>1</sup>lanoM BO3AeICTBH5I na3epHopo HbnInbCa H noslwleHHeM aKyCTHecKopo cHrxana Ha6nioAaeTCI apeMeHHan 3ajep)Kxa. BenHLnra wok' 3a,rep)KKH onpe)TCTI TpeM\$1 4 aKTopaMH: pacToaHneM OT He'rowmKa 3Byxa, KOTopbIM nnnsicTci o6pnyaeMasI noaepxxocTb 6HOTKaHH, AO npHeMHHKa, perHCTpHpnyonero axycTHleCKH\$ HMInbC; HHTCHCHBHOCThIO na3epHopo H3ny<sup>1</sup>ieHH5I Ha nobepxhocTH o6pa6aMIBaeMoII TKaHH H BenWIHOII nopora ee pa3pymeHH5I.

I4CCneAOBABH3I noxa3ann, HTO aKyCTH<sup>1</sup>leCKH4 HMnyhbC, B03HfKaOnI if npH pa3pynleHHH 6aoTKaHH c 6onee HH3KHM nOpOpOM na3epHopo pa3pymelum, HanpHMep AeHTHHa, HMeCT MeHbBlyIO BpeMeHHyIO 3a,BepIKKH oTHOCHTenbHO nauana na3epHopo HMnyhbca, ueM aKyCTHueCKH\$. HMInbC, H03HHKaOnIaII npH pa3pymeHMI TKaHH C 6onee BbICOKHM nOpOpOM pa3pymeHHH, HanpHMep 3Manz (CM. G.B. Altshuler, A.V. Belikov, at all "Acoustic response of hard dental tissues to pulsed laser action". SPIE VOL 2080. Dental Applications of Lasers, 1993, p.p. 97-103).

TaKHM o6pa3om, HAcHTH4HKamm BHAA o6pa6aTbIBaeMol TKaHH 3aBHCHT OT TO'HOCTH H3MepeHnn BpeMeHHOI 3ajep.iKKH.

3axpenneHHe axycTHUecKopo npHeMHHKa BHyTpH HaKOHe<sup>1</sup>IHHKa ocBo6oxc,aeT OneyallnOHHe none OT AOBOnHHTenbHbIX npHCH006neHHft, CBOANT K MHHHMMy /pnyKTya11H10 napaMe rpon npnHSITOpo alycTHUecKopo cHrHana H 3aBHCBMOCrb Beml'WHbI BpeMeHHO\$ 3ajepxCKH OT MaHHnyH5ILW11 onepaTopa, a TaK)Ke 3an rngaCT aKycTnuecKHil npHeMHHK OT CarlaLIHbIX nOBpe)KAeHnYI.

fioMeujeHHe aKyCTy<sup>1</sup>leCKOpo npHeMHHKa c 9neKTpH4CKHM BbIXOAOM BHyTpH HaKOHe<sup>1</sup>IHHKa Bne<sup>1</sup>leT 3a co6oi HanB<sup>1</sup>fe B nocnejHeM HpOBOAHHKa c TOKOM. B 9TOM cnytae Heo6xo) nMo 06e30naenTb KaK na11HeHTa, TaK H onepaTopa OT Cny<sup>1</sup>ailHO B03MO2KHbIX 3eKTPOIHOBOBIX n03AeICTBII4il. KpoMe Toro, Heo6xo3Ma noMexoyCToc<sup>1</sup>wBaa nepejja<sup>1</sup>la BbIXOAHHX CHrHanOB K 6noKy HX perneTpailHH. fio9TOMy CoeAHHeHHe BbIXOAa aKyCTH<sup>1</sup>leCKOpo npHeMHHKa c 6nOKOM perHCTpaun,nyinoIHeno nOCpeACTBOM 3KpaHHpOBAHHOpo Ka6ena.

no CBACHHHM aBTopa COBOKyHHOCTb H3IO<sup>1</sup>KCHHbIX B ipOpMyTie H306eTCHH3I 11p3HaKOB snBcneTcI HOBOII, a caMO TexHwecKoe peiueHHe yAOBneTBOpHeT KpHTepHO "Ii306eTaTenbCKH4 ypoBeHb".

Ha 4 nr. 1 CXeMaTH<sup>1</sup>leCKII H3o6pa)KeH 6eKOH-TaKTHbIYI HaKOHe<sup>1</sup>niHK na3epHOi CHCTeMbI jinsi 06pa6OTKH 6HOTKaHH; Ha 4Hr. 2 KOHTaKTHbII HaKOHe<sup>1</sup>IHHK.

BeCKOITaKTHbII HaKOHe<sup>1</sup>IHHK \*Hr. 1) COCTOHT H3 Kopnyca 1, BHyTpH KOTOpOpo paCHOITO)Klibl onrmleCKa5I CHCTeMa, COCTO5IH45I H3 OnTB<sup>1</sup>leCKOpo BOnOKHa 2, KOnnuMIpyIOIA02 nHH3bI 3, pOBOpOTHOpO 3epKana 4 H4IOKynpyloIIeii nHH3bI 5, a TaKK)Ke BoAonponOAHAaai Tpy6Ka 6 H B03AyXOnpOBOAIIIIax Tpy6Ka 7. AKyCTH4eCKHII npHeMHHK 8 3aKpenneH BHyTpH HaKOHe<sup>1</sup>IHHKa TaKHM o6pa3om, 5TO epO aKyCTHueCKHII BXA o6panen K MeCTy Bo3AeICTBH Ha 6HOTKaHb 9 (HCTO<sup>1</sup>nmicy aKyCTH<sup>1</sup>leCKO2 BOnHbI), a 9neKTpM<sup>1</sup>ieCKHYI BbIXOA COeAHHeH c 6YOKOM perHCTpa11HH 10 nocpeACTBOM 3KpaHHpOBAHHOpo Ka6e II 11. flepee BXAOM aKycTHUecxopo npHeMHHKa 8 Ha nonepXHOCTH HaKOHe<sup>1</sup>IHHKa paCHOOnO)KeHa AHacppapMa 12. Pa6otmil HHCTpyMeHT 13 (BOnOKHO HnH ca I(DRpoBbbyI CTepKem) KOHTaKTHOpO HaKOHe<sup>1</sup>IHHKa IIOKa3aH Ha 4 nr.2. IlpH pa6oTe c HHM MeCTO B03AeICTBn5I Ha 6uoTKanb 9 yAaneHO OT nonepXhocTH HaKOHe<sup>1</sup>IHHKa 6o1lbHle, <sup>1</sup>ieM HpH pa6OTe c 6eKOH-TaKTH,IM HaKOHe<sup>1</sup>IHHKOM.

MeCTOaenonoxcenHe aicyCTH<sup>1</sup>ieCKOpo npHeMHHKa 8 onpe,eneHo H3 CneyIOII.IHX coo6paxceHHii.

## RU 2082337 CI

Y<sup>1</sup>HTbluan, uTO HaBMeHbinee paccTonne OT IOBepXHOCTH HaxonegHHKa go MecTa BO3J4CLICTBH5I Ha 6HOTKaHb 9 MO?KeTMCHSITbCH H jvui pa3nu'HHX BHJitOB TKaHCH H o6pa6oTxx xone6neTen OT 8,5 go 20 MM, a JjIaMeTp (DoKycxpyloueti nHH3bI 5 pasen 3 MM OT onT14<sup>1</sup>leCKO1i och 4oxycnpylonje i JHH3b1 5 no HaIpaBnemno, nepne1J;i'i'IKynslpxoMy 9TO11 oex. MaxcHManbHO BO3MWKHoe yganenne aKycTHUecKoro npxeMHHxa 8 OT !Accra Bo3JjeLICTBHcT Ha 6140TKallb 9 orpa1HJnJBaeTCSI cHH?KeHHeM <sup>1</sup>ryBC"TBHTerlbHOCTH Coma perrCTpan1ouBoro axycTHUecxoro cxxnana H 9KpaHHpoBaHxeM BxoJja axycTHUecxoro npneMHHxa 8 pyxoft onepaToPa H cocTaBnxeT 34 MM. Y<sup>1</sup>nITbBaH 4opMy HaKOHCH<sup>4</sup> HHKa, axycTHUecKH11 npHeMHHK 8 3axpennex nepeJj 6nx7?xai mek K mealy B03AC2CTBVISI Ha TKaHb BepMEHOLI yrna H3r16a Tena HaKOHeuHHKa TaK, <sup>1</sup>TO1COO'tH0meHHe paCTOSIHNSI OT onTHUecKO1 Och go BXOJjHOLI noBepXHOCTH axycTHUecKoro npxemynKa 8 H paccTosinxn OT IOBepXHOCTH HaKOH<sup>1</sup> HHKa B MCCTe ero ONTHUCCKOPO BbIXOga go MCCTa BO3Jje1CTBH H 6HOTKamb, HaxogwrCSI B npegenax OT 1:5 go 4:1.

LICCne) OBAHHn, npo ejjeHtn'le aBTOpOM, noxa3ann, <sup>1</sup>TO npH pacnono?KeHBin axycxJlecxoro npHeMHHKa B yxa3aHHbxx raper enax axycTnuecxasI Bonxa, o6pa3ylonkacH npH na3epHO\$ a6nsnjxx 6HOTKaneil, vxMeer aMnnxTypy, rocTaToH yto Rnx perxcTpanxz axycTHUecKHMH npxeMHHKaMH, KpOMe TOM, B 3THX npejjenax axmnwTyr a aKycTHUecKOI BOJHbI HeCeT HH4IOpMaI *wo*o Tnne o6pa6amxae Moil TKaHH.

gna(pparMa 12 MO?KeT 6bITb BbIHOJHeHa 143 MeTaJlnUeCKOLi 4)OpMbl HnH nonHMepHOR HneHHK; *pOnb* KOTOpbIX 3aKrho<sup>1</sup>iaeTCSI B 3aJ\$HTe BXOJjHO11 HOBepXHOCTH aKyCTHueCKOro npaeMHHKa 8 OT pa3neTaIOIB XCH uaCTH<sup>1</sup>lex 6HOTKaHH 9 H 6pb13r BOJjb1, a TaxIKE cIBJIAeTCH pe3onaTopOM aKyCTHUCCKHX xone6aux14.

Прxx npaxTHJlecxoft peanH3a1wH HaxoHeHHKa B KaueCTBe axycTHUecxoro npneMHHKa 8 Bh16paH MHKpO4OH 12HpMbl Bplonb H K'ber 4138 B KoMnnexce c npeJycanwTeneM 2633 H nepeXO) HHKOM UA 0160.

TaKHM o6pa3oM, npejnnaraeMoe ycTpOJICTBO HaKOH<sup>1</sup>HHKa 3a cueT COBOKynHOCTH 3a5IBnS1eMbxX npH3HaKOB o6ecneuHBaeT MHHHManbHyIO TpaBMaTH<sup>1</sup>HOCTb npH npoeJ(ennn na3epHoi o6pa6oTKH 6HOnOpHueCKON TKaHH B COUeTaHHH c yjJO6CTBOM npoBerjeHHH o6pa6oTKH.

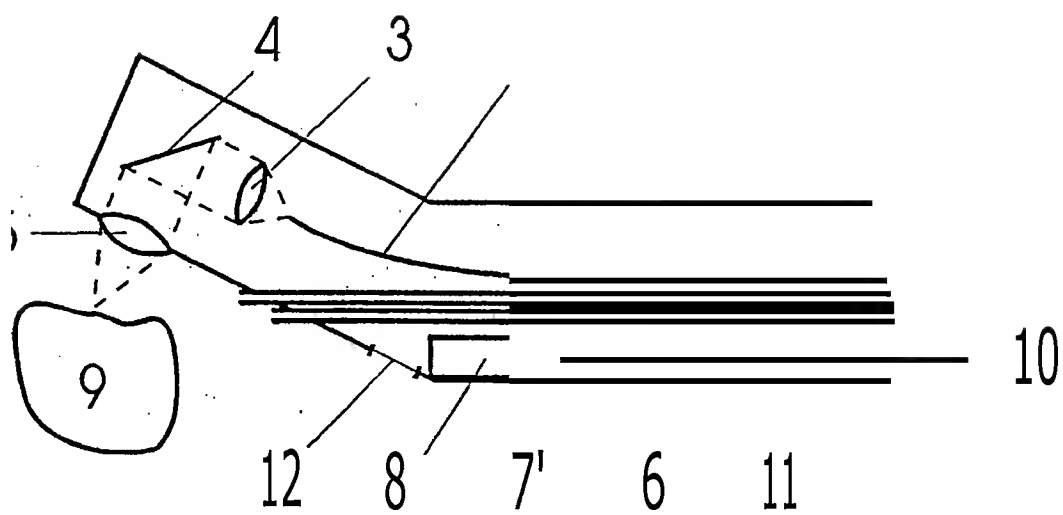
Claims [(Dopasyna H3o6peTeHHH):

1. HaXOHe<sup>L</sup>HHK na3epnov"i cHCTelnl J;ñH o6pa6oTKH 6HonorHHecHoti TKaHH, cogepaKantnia iCpCgCTBO JJOCTaBKH na3epHoro H3HlyMCHHH go noBepxHOCTH 6HOTKaiH, OTTH<sup>L</sup>alOnWRiiCSI 'rem, LITO BHyTpH Hero 3aipenneH axycTH<sup>L</sup>lecKHIZ npHezHHK, BXOJ; KOTOpOpO conpH,KeH c MCCTOM BO3,HCRCTBHH Ha 6HOTKamb TaK, <sup>L</sup>ITO COOTHOMeHHe pacce'rommH OT OHTHHeCKOI OCH Ha BbIXOJ;e HaKOHeliHHKa J;o BXOAHOH UOBCpXHOCTH axycTHLlecKOro npHeMIndia H paCCTOHHHH OT HOBCpXHOCTH HaKOHeliHHKa B MecTe ero onTH<sup>L</sup>lecKOro BbIxoga go mm-1'a .BO3J;c CTBHH Ha 6HOTKaMb HaXOgHTCH B npegenax 1 5 4 1, a 3neKTpH<sup>L</sup>lecKH7i BbIXOg cCOc 1ñCH c 6noKOM perCTpaHHH nocpegTBOM 3KpaHHpOBaHHOro Ka6enH.

2. Hasoxe'nlHK no n. 1, oTnH<sup>L</sup>axOIwiicH 'rem, <sup>L</sup>ITO coj;ep]KHT cpegCTBO J;oCTaBKH •opomaiozueft KHgKOCTH go noBepxHOCTH 6HOTKaHH.

RU 2082337 C1

Drawing(s) [1epTemn]:



cVlr. 1

